REMARKS/ARGUMENTS

Claims 1 to 21 are pending in this application. Claims 1, 2, 3, 7 and 9 have been amended, no claims have been cancelled or added. No new matter has been presented in making this amendment.

Rejections Over Haugen and Skene Under 35 U.S.C. 103(a)

The Examiner rejected claims 1, 2, 5-9, 11 and 12 under 35 U.S.C. 103(a) as being unpatentable over Haugen (U.S. Patent No. 6,742,596 B2) in view of Skene (U.S. Patent No. 4,592,125). Applicants respectfully traverse this rejection in light of the amended claims.

Independent claims 1 and 7 both require a make-up and break-out system that constantly monitors three parameters "torque, turn, and rotational speed" during the make-up procedure, and controls or halts the make-up procedure in view of feedback signals of torque, turn, or rotational speed generated by the top drive. In addition, the current system is designed to be an automated control system, that varies the direction, speed, torque and number of turns during a multi-phase make-up or break-out process. For example, in describing the operation of the current system Applicants write:

> There are several standard phases to a making-up process. For example, first the make-up control system matches the threads of the tubulars by rotating the rotatable tubular in a direction opposite the threading direction of the threads of the rotatable tubular during a thread matching phase. Once the threads of the tubulars have been matched, the make-up control system rotates the rotatable tubular in a threading direction to initiate the threaded connection of the tubulars during an initial threading phase. After the threading has been initiated, the make-up control system increases the rotational speed of the rotatable tubular during a main threading phase. The make-up control system then decreases the rotational speed of the rotatable tubular near the

> completion of the threaded connection during a final threading phase so that the tubulars do not experience an abrupt stop. The make-up control system then incrementally increases the torque that is applied to the rotatable tubular until the threaded connection is tightened to a final torque value during a tightening phase.
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> During each of the above phases of the make-up process, the make-up control system sets either a turn number or a torque limit that the top drive is allowed to apply to the rotatable tubular. The make-up control system then monitors the number of turns, torque and/or the amount of rotation applied to the rotatable tubular by the top drive during each phase of the make-up process and stops the make-up process. When one of the above parameters exceeds the limit for that phase, an error is indicated in the make-up process, such as cross-threading, thread damage, or excessive supply of thread compound, among other possible errors.
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> (Specification, page 5, line 3 to line 31.)

Accordingly, the current control system allows for the continuous monitoring and control of the make-up/break-out process, not only in response to faults (or overlimits), but also in response to a set of instructions concerning the operation of the device during a multi-phase make-up/break-out process.

In contrast, the combined make-up system described in the Haugen and Skene patents is deficient on a number of grounds. First, Haugen only discusses monitoring torque and turns, never the rotational speed of the tubular or its direction during make-up as required by amended claims 1 and 7, upon which the remaining rejected claims depend. Although the Examiner partially addresses this deficiency by citing to the Skene patent, which does contemplate a make-up system that monitors torque, turns and speed, Skene does not monitor or control the direction of rotation. More fundamental, however, both the system in Haugen and the system in Skene are only designed to monitor for faults, and halt operation in the case of a connection fault. For

example, in discussing how the system determines when a "good connection" is made, Haugen states:

> The controller is preprogrammed with acceptable values for rotation and torque for a particular connection. The controller compares the rotation data and the torque data from the actual connections and determines if they are within the accepted values. If not, then the spider remains locked and closed, and the tubular can be rethreaded or some other remedial action can take place by sending a signal to an operator. (Haugen, col.5, lines 46 to 53.)

In short, Haugen only analyzes the torque and turns parameters after "connections" have been made to allow for "remedial" correction. Nowhere, does the Haugen patent discuss the possibility of monitoring parameters for a connection during the actual make-up process so that real-time limits can be set.

In turn, Skene describes the operation of its system as follows:

> In the operation of the system just described, there are two operators, a tong operator who is not normally in a position to see the display monitor 47 and a computer operator who will normally be in a position to watch the display monitor and the tong operator and who will be able to equate the graph or any changes thereof with external influences on the joint, such as an increase in friction. The computer operator enters data relating to the particular lengths of tubing (based on size, weights, grades, connection types, etc.) into the analyzer using a keyboard entry facility in the form of momentary contact switches 48. The ends of the lengths of tubing 22 and 23 are located and the joint is made up using the tong unit 25 in conventional manner. The hydraulic drive apparatus 27 operates the rotary table 24 which applies a torque to the upper length 22 of tubing. The reaction to the applied torque appears at the point 31 of the tong unit and acts on the load cell assembly 35 whereby a signal is generated which is fed to the analyser 46. During the

make-up of the joint between the two lengths of tubing, the continuously varying torque values and the tubing data are analysed in accordance with a set of pre-programmed algorithms, including detection of rapid changes in the torque applied (detection of "shoulder" position). The analyser also checks these values against those limits within which known good joints exist. *The result of the analysis determines the point of time at which the dump valve is actuated to stop the rotary table thereby ensuring either a good joint or a bad joint.*

The horn 40 provides the operator with an audible indication of the state of the make-up and also a warning if the maximum tong r.p.m. is exceeded. The horn is a multi-tone horn and serves to warn the tong operator firstly that 80% of the optimum required torque has been reached (interrupted tone), secondly that the computer has registered a good connection according to the preprogrammed parameters (steady uninterrupted tone) or thirdly and alternatively, that the computer has registered a bad connection outside the preprogrammed parameters (frequency modulated tone). *In the second and third cases the dump valve is also operated to stop the drive to the tong unit. The dump valve is also operated if the predetermined maximum tong r.p.m is exceeded.* It is to be noted that the computer operator is alerted to the fact that the shoulder position has been reached by a colour change (e.g. green to red) on the display monitor 47.

(Skene, col. 5, line 36 to col. 6, line 15, emphasis added.)

In short, the control system of Skene relies on two manual operators to monitor the data and determine the state of the system. In addition, the only *control* contemplated for the control system is the operation of a "dump valve" should a predetermined limit in torque, turns, or speed be reached. Nowhere does the Skene patent ever disclose or even contemplate a system that would continuously monitor *and control* the speed and torque

of the make-up system, much less that would operate the system to change the direction of rotation in response to a pre-programmed set of control instructions.

This deficiency makes sense if the purpose of the Haugen and Skene devices are contrasted with the purpose of the current make-up control system. Whereas the prior art devices are simply designed as "interlocks" to ensure that the connections at the end of the process are not deficient, the current invention is directed to a fully automated system and process for improving the way connections are made-up and broken-out to ensure that tubulars are not damaged as a result of cross-threading, etc. during a make-up process. (See, e.g., Specification, Background of Invention.) As a result, the current system is not just directed to determining whether the final connection is sufficiently strong, but to control and monitor the threading process itself from beginning to end.

For both of the above-reasons, Applicants respectfully submit that one of ordinary skill in the art, having read the combined disclosure of the Haugen and Skene patents would not have been motivated to form the make-up break-out control system and method disclosed in claims 1, 2, 5-9, 11 and 12 of the instant invention, and request reconsideration and withdrawal of this rejection.

Rejections Over Haugen, Skene and Nishikawa Under 35 U.S.C. 103(a)

The Examiner also rejected claims 3, 4, and 10 under 35 U.S.C. 103(a) as being unpatentable over Haugen (U.S. Patent No. 6,742,596 B2) in view of Skene (U.S. Patent No. 4,592,125) in further view of Nishikawa (U.S. Patent No. 4,885,963). Applicants respectfully traverse this rejection in light of the amended claims.

For the reasons stated above, Applicants do not believe that the combination of Haugen and Skene render the claims of the instant invention obvious, nor does the patent to Nishikawa correct the deficiencies of the Haugen and Skene references. Unlike both the current application and the Haugen and Skene patents, the Nishikawa reference is directed to a manufacturing tool for turning, cutting, or threading pipe, not to a device for making-up and/or breaking-down connections in tubulars at a gas well.

As a result, nowhere does Nishikawa ever discuss monitoring parameters such as torque, turns, and speed during a make-up or break-down process to ensure proper threading of a tubular connection as required by the claims of the instant invention. One of ordinary skill in the art having read the disclosures of Haugen, Skene and Nishikawa references would have had no teaching or motivation to modify the Haugen and Skene references to obtain the make-up system and method claimed in the current application. Accordingly, Applicants respectfully request reconsideration and withdrawal of this rejection as well.

Conclusion

In view of the foregoing amendment and response, it is believed that the application is in condition for allowance and, accordingly, reconsideration and allowance is earnestly solicited.

If any questions remain regarding the allowability of the application, Applicant would appreciate if the Examiner would advise the undersigned by telephone.

The Commissioner is hereby authorized to charge any fees under 37 CFR 1.16 and 1.17 which may be required by this paper to Deposit Account No. 03-1728. Please show our docket number with any charge or credit to our Deposit Account.

Respectfully submitted,
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